

Directions: Do not simplify unless indicated. No calculators are permitted. Show all work as appropriate for the methods taught in this course. Partial credit will be given for any work, words or ideas which are relevant to the problem.

Please put problem 1 on answer sheet 1

1. Given $\bar{a} = 2\hat{i} + 5\hat{j}$ and $\bar{b} = -1\hat{i} + 6\hat{j}$.
- (a) Find the unit vector in the direction of \bar{b} . [8 pts]
- (b) Find $\text{Pr}_{\bar{b}}\bar{a}$. [12 pts]

Please put problem 2 on answer sheet 2

2. A sphere is centered at $(3, -2, 5)$ and the point $(4, 0, 2)$ is on the surface of the sphere.
- (a) Write down the equation of the sphere. [12 pts]
- (b) Is the origin inside, outside or on the surface of the sphere? Justify. [8 pts]

Please put problem 3 on answer sheet 3

3. (a) Sketch the plane $x + 3y = 9$ and label four points with their coordinates. [10 pts]
- (b) Sketch the vector-valued function $\bar{r}(t) = 2\hat{i} + \cos t\hat{j} + 3\sin t\hat{k}$ for $0 \leq t \leq \pi$ and label the start point, end point, and some other point with their coordinates. [10 pts]

Please put problem 4 on answer sheet 4

4. Find the equation of the plane containing the point $(1, 2, 3)$ and containing the line with symmetric equation [20 pts]

$$\frac{x-1}{2} = y+3 = \frac{z}{5}$$

Write this equation in the form $ax + by + cz = d$.

Please put problem 5 on answer sheet 5

5. Given the vector valued function $\bar{r}(t) = 5\hat{i} + t^2\hat{j} - 2t^3\hat{k}$ for $-1 \leq t \leq 3$.
- (a) Is this curve smooth, piecewise smooth, or neither? Justify. [12 pts]
- (b) Write down but do not evaluate the integral for the length of the curve. [8 pts]

The End and the TA Section List

Tessa	0411 = 8:00	0421 = 9:00
Weikun	0412 = 8:00	0422 = 9:00
Shuo	0431 = 10:00	0441 = 11:00
Zeyad	0432 = 10:00	0442 = 11:00